IN THE TITLE:

The title has been amended herein. Pursuant to 37 C.F.R. §§ 1.121 and 1.125 (as amended to date), please enter the title as amended.

~~METHOD AND~~ APPARATUS FOR APPLICATION OF ADHESIVE TAPE TO SEMICONDUCTOR DEVICES

IN THE SPECIFICATION:

Please amend paragraph number **[0006]** as follows:

[0006] Alternatively, a lead-over chip (LOC) leadframe, also sometimes referred to as a lead-on-chip ~~(LOC)~~ leadframe, is used to provide lead fingers to be electrically connected to the bond pads of the semiconductor device through wire bonds thereto and to support the semiconductor device by being adhesively secured to the active surface thereof and, subsequently, encapsulated. A LOC type semiconductor package is described in U.S. Patent 4,862,245 (Pashby et al.).

Please amend paragraph number **[0012]** as follows:

[0012] A system for applying adhesively coated tape material to the die sites of semiconductor leadframes includes a first source for supplying a first length of adhesively coated tape material to a first location of a die site of the leadframe and a second source for supplying a second length of adhesively coated tape material to a second location at the die site of the leadframe after the indexing of the die site of the leadframe to another location for the application of tape thereto. Indexing means are also provided to supply and index for the application of tape to a die site of a plurality of leadframes for semiconductor devices in die ~~site by die~~ site-by-die site of a leadframe-by-leadframe sequence. An "application means" is configured to receive the plurality of leadframes for semiconductor devices in a die ~~site by die~~ site-by-die site of a leadframe-by-leadframe sequence and to receive the first length and the second length of adhesively coated tape materials, supplied in strip form. The application means has cutting means for independently cutting a first increment from the first length of adhesively coated tape material and applying the first increment to a first portion of a die site of a leadframe of the plurality of leadframes, supplied in strip form. The cutting means of the application means also independently cuts a second increment of the second length of adhesively coated tape material and applies the second increment to a second portion of the die site of a leadframe of the plurality of leadframes. Control means are interconnected to the application means, to the

indexing means, to the first source and to the second source, all supplying operation signals to the control means.

Please amend paragraph number **[0018]** as follows:

[0018] In preferred configurations, the first driving means and the second driving means both include a guide structure to guide the first length between the supply of adhesively coated tape material and the first cutting structure.

Please amend paragraph number **[0019]** as follows:

[0019] The indexing means preferably includes a structure configured to urge the plurality of leadframes in strip form for semiconductor devices in leadframe-by-leadframe sequence relative to the application means. The plurality of leadframes is connected one to the other in a continuous strip form. The indexing means preferably includes a movable member which engages at least one indexing hole of at least one rail of the leadframe strip to move the leadframe the desired distance for the application of the adhesively coated tape material. The indexing means alternately includes a roller with a motor connected to drive the roller. The motor is connected to the control means to receive operation signals therefrom to cause the motor to move the plurality of leadframes relative to the application means in the ~~leadframe-by-leadframe~~ leadframe-by-leadframe sequence. The plurality of leadframes preferably is formed in a continuous strip form having removable carrier rails or edges thereon having, in turn, drive perforations formed therein. The roller desirably includes a plurality of teeth positioned to drivingly engage a portion of the drive perforations to thereby connect to and drive the plurality of leadframes.

Please amend paragraph number **[0028]** as follows:

[0028] The application means includes a first die for cutting the first decal and a second die for cutting the second decal. The indexing means operates to advance the first LOC leadframe of the plurality of leadframes to position its first site to receive the first decal, to index

the first leadframe to position its second position of a die site to receive the second decal, and to concurrently index a second LOC leadframe of the plurality of LOC leadframes to position the first site of the second LOC leadframe on the plurality of LOC leadframes to receive another first decal at the same time that the first LOC leadframe is to receive the second decal.

Please amend paragraph number **[0043]** as follows:

[0043] Control means is also provided to provide control signals or operation signals to operate the system. The control means ~~here~~ shown here includes a controller 32 interconnected to operate the indexing means and, more particularly, the indexing structure 20. It is also interconnected to the first source 12 and to the second source 16 to respectively supply the first length 14 and the second length 18 to the application means and, more particularly, the application structure 30. The controller 32 supplies operation signals to operate the cutting means of the application means to selectively cut and supply the first increment of the first length 14 to the first portion of a die site of a leadframe of the plurality of leadframes 22-26 and to selectively cut and apply the second increment from the second length 18 to the second portion of a die site of a leadframe of the plurality of leadframes 22-26.

Please amend paragraph number **[0046]** as follows:

[0046] As also seen in drawing FIG. 1, the second source 16 includes a second adhesive supply 54 of adhesively coated tape ~~material 54~~ material associated with a reel 56 on axle 40. The second adhesive supply 54 includes a circular roll of adhesively coated tape material 55 that passes through, over or about a second guide 58 which is also rotatably or fixedly mounted about the axle 44. The second length 18 proceeds from the second adhesive supply 54 to the second drive structure 60.

Please amend paragraph number **[0047]** as follows:

[0047] As here shown, the second drive structure 60 includes second drive roller 62 which is driven by a second stepping motor 64 via a second drive shaft 66. The second stepping

motor 64 is interconnected by conductor 68 to receive electrical drive signals from the controller 32. That is, upon receipt of an electrical signal, the second stepping motor 64 rotates, in turn, causing the second drive shaft 66 and the second drive roller 62 to rotate to urge the second length 18 toward the application structure 30 and, more particularly, the second cutting structure a preselected distance which preferably is the length of the increment or decal.

Please amend paragraph number **[0049]** as follows:

[0049] The application means may include a block 88 positioned above the application structure 30. As hereinbefore noted, each leadframe, such as leadframe 23, has a first portion ~~90 of~~ of a die site 90 to receive a first increment of the first length 14. The first increment may also be referred to as a decal. The first increment or decal is urged upward by a die through a first die aperture 92 in the application structure 30. Similarly, a second increment or decal is urged upwardly by a second die through a second die aperture 94 to position the second decal or increment at a second site such as second portion of a die site 96. As the leadframes 22-26 move 98 by operation of the indexing structure 20, the first portion of a die site 90 is positioned relative to the first die aperture 92. Activation of the application structure 30 by the controller 32 causes the application structure to apply the first increment or first decal through the first die aperture 92 to a leadframe and, more particularly, to the first portion of a die site 90 of a leadframe such as leadframe 23 of the plurality of leadframes. Similarly, on positioning of the second portion of a die site 96 relative to the second die aperture 94, the controller 32 causes the application structure 30 to operate and, in turn, apply the second increment or second decal through the second die aperture 94 to the second portion of a die site 96 of a leadframe such as leadframe 23 of the plurality of leadframes 22-26.

Please amend paragraph number **[0050]** as follows:

[0050] In operation, the first leadframe, such as leadframe 23, is indexed to position the first portion of a die site 90 relative to the first die aperture 92. In turn, the controller 32 activates the first stepping motor 50 via conductor 52 to, in turn, operate the drive roller 46 of the first

drive structure 36. In turn, the first length 14 is urged toward the application structure 30 so that the first increment or first decal can thereby be formed by the application structure as more fully discussed hereinafter. With the first portion of a die site 90 of the leadframe 23 positioned relative to the first die aperture, and with no second portion of a die site, such as of leadframe 24, positioned relative to the second die aperture 94, the controller 32 does not activate the second stepping motor 64. In turn, the second length 18 is not urged toward the application structure 30. In turn, the second increment or decal is not formed and is not urged upward through the second die aperture 94. A savings in adhesively coated tape material is thereby realized. Further, adhesively coated tape material 55 is not applied upward against the block 88 and does not build up over time to interfere with the quality and operation of the system 10. That is, the adhesively coated tape material can build up and interfere with the smooth operation of the system and to potentially interfere with the quality of a particular leadframe of the plurality of leadframes.

Please amend paragraph number **[0051]** as follows:

[0051] The controller 32 here illustrated may be any combination of electronic and electromechanical devices having an input structure to receive input data pertaining to the desired speed as well as the length of the increments and the size (e.g., length) of the leadframes. Preferably, a computing structure is positioned therewith to generate signals to, in turn, cause electromechanical devices to supply electrical energy via a plurality of relays and conductors. The electrical energy is received from the conventional sources of electrical energy via a conductor 100. A plurality of relays or the equivalent thereof in the controller 32 is activated to supply electrical energy via conductors 68 and 52 to their respective stepping motors 64 and 50, as well as to activate the application structure 30, all to form and apply the first increment and the second increment from the first length 14 and the second length 18 of the adhesively coated tape materials 35 and 55. Similarly, relays or their equivalent are activated to supply signals via conductor 76 to, in turn, cause the drive motor 74 to index and to drive the plurality of leadframes 22-26 relative to the application structure 30.

Please amend paragraph number **[0061]** as follows:

[0061] The punch guide insert 176 has a left tape guide 200 and a right tape guide 202. It can be seen that the left tape guide 200 and the right tape guide 202 are both C-shaped in ~~cross section,~~ cross-section, providing lower left flat surface 204 and lower right flat surface 206, respectively. It can be seen that the left tape guide 200 has a width 208 which is sized to be comparable to the width 210 of a first length 212 of adhesively coated tape material which is comparable to the first length 14 shown in FIG. 1. Thus, the first length 212 of adhesively coated tape material can move in and be guided and aligned by the left tape guide 200 as the first length moves toward a first die aperture 214 which is similar to the first die aperture 92 shown in drawing FIG. 1. Notably, the left flat surface 204 is planar or substantially level and fabricated of a metal material that will minimize the amount of friction between the left flat surface 204 and the first length 212. It may also be noted that the left tape guide 200 has a left ~~side wall~~ sidewall 216 and a right ~~side wall~~ sidewall 218 in order to provide lateral support for the first length 212 and, more particularly, to guide the first length 212 as it moves toward the first die aperture 214. The left tape guide 200 provides for movement of the first length 212 in a direction 220. In other configurations, the left tape guide 200 may provide for movement of a first adhesively coated tape material opposite to direction 220.

Please amend paragraph number **[0062]** as follows:

[0062] It can also be seen that the right tape guide 202 is formed to be similar in configuration to the left tape guide 200. More specifically, the right tape guide 202 has a left ~~side wall~~ sidewall 224 and a right ~~side wall~~ sidewall 226. The width 228 of the right tape guide 202 is selected to provide for a snug but slidable fit of the second length 230. More particularly, the width 228 of the right tape guide 202 is selected to be substantially the same as, but slightly more than, the width 232 of the second length 230. Similarly, the right tape guide 202 extends along the full length 234 of the punch guide insert 176 so that a second length, such as second length 230, may move in a direction 236 from the forward portion 180 to the rear portion 182 as shown or in a direction opposite to direction 236.

Please amend paragraph number **[0065]** as follows:

[0065] It should also be noted that the width 208 of the left tape guide 200 and the width 228 of the right tape guide ~~203~~ 202 may be substantially identical. Alternatively, the width 208 and the width 228 may vary in order to accommodate tape material of different widths which may be selected as desired by the user.

Please amend paragraph number **[0071]** as follows:

[0071] Four guide posts 294-297 are also shown in drawing FIG. 3. They are sized in ~~cross-section~~ cross-section to snugly fit within the corresponding apertures 298-301 formed in the base 160. Screws, or any other suitable structure, may be provided to snugly secure the guide posts 294-297 within the corresponding apertures 298-301. Four bushings 302-305, shown in drawing FIG. 4, are sized with interior apertures 306-309 to snugly and slidably fit over the guide posts 294-297. The bushings 302-305 also slidably fit through corresponding apertures 310-313 formed in a punch shoe 314. A left die 316 is also shown in drawing FIG. 4. The left die 316 has a width 320 and a length 322 selected to snugly fit within the punch shoe left die aperture 324 and to correspondingly register with and slide snugly through the first die aperture 214 in the punch guide insert 176 shown in drawing FIG. 3. Further, the left die 316 will pass through the notch 280 as it proceeds upwardly toward a semiconductor device leadframe which is passing over the top surface of the application structure, which top surface is comprised of the top surface 241 of the tape lead-in guide 240 and the corresponding top surface 259 of cutter block 258 and the top surface 277 of the guide insert 276. That is, the left die 316 is sized in height 326 to extend upwardly a distance so that the top surface 328 contacts the leadframe of a plurality of leadframes of semiconductor devices passing over the top surfaces 241, 259 and 277 in order to adhere a first increment of the first length 212 to a portion of a die site of a leadframe of the plurality of leadframes, such first site being selected by positioning a leadframe of each of the plurality of leadframes in a desired location and by

selecting the width 190 of the punch guide insert 176 and, more particularly, the distance between the left tape guide 200 and the right tape guide 202.

Please amend paragraph number **[0077]** as follows:

[0077] Turning to drawing FIG. 5, a simple side view of an application structure 362, similar to the application structure of drawing FIGS. 3 and 4, as well as the application structures 30 and 108, is depicted. A second length of adhesively coated tape material 364 from a supply of adhesively coated tape material extends through the application structure 362 to a second die channel 366. That is, the application structure 362 has a channel 366 sized to snugly and slidably receive a second die 368 to move past a cutter block 370 and a corresponding guide insert 372 comparable to the cutter block ~~358~~ 258 and the punch guide insert 176 of drawing FIG. 3.

Please amend paragraph number **[0082]** as follows:

[0082] Referring to the third application structure 418, first tape guide 420 is shown having a central axis 422. The top 424 of a first die is shown in its first die channel extending upwardly through a first die notch 426 formed in a guide insert 428. Similarly, a second tape guide 430 is shown having a central axis 432. The top 434 of a second die is shown extending upwardly through a second notch 436 in the guide insert 428. The guide insert 428 is positioned proximate a cutter block 438 which, in turn, is adjacent the top surface 440 of a tape lead-in guide 442. As can be seen, the central axis 422 of the first tape guide 420 is spaced from the central axis 432 of the second tape guide 430 a distance 444 which may be said to be one leadframe or one pitch. In the preferred illustrations, the distance 444 in fact is equivalent to the overall length 446 of each leadframe 392-399 and 405-412 of the respective pluralities of leadframes 390 and 404. The ~~length~~ distance 444 may be a pitch which is different than the length 446 for those leadframes having more than two sites for a first increment or decal and/or a second increment or decal. In typical applications such as that here illustrated, one pitch equals the length 446 of one leadframe.

Please amend paragraph number **[0084]** as follows:

[0084] In reference to the first plurality of leadframes 390 and the second plurality of leadframes 404, it can be seen that each has leadframes joined one to the other. The leadframes have removable edges 464 and 466 each formed with notches or apertures 468 and 470 which are used in association with indexing means to urge the plurality of leadframes 390 and 404 to move relative to the application structures 400 and 416. It may also be noted that a last leadframe such as, for example, leadframe 394, will proceed over the top surface 402 of the first application structure 400. That is, if the plurality of leadframes 390 is severed along a line 472, leadframe 394 becomes a last leadframe in which first site 474 is positioned relative to the top 462 of the first die, after which its second site 476 is positioned over the top 458 of the second die. When the second site 476 is positioned over the top 458 of the second die, the top 462 of the first die is exposed and does not have a leadframe or a leadframe with a first site positioned thereover. Thus, a first increment or decal proceeding upward does not have a site against which it is to be positioned. In the event that the first length of the supply of adhesively coated tape material is advanced over the first die, a first increment would be formed and could potentially attach to the underside of a block such as, for example, block 386. In turn, the potential for contamination with unused increments is evident.

Please amend paragraph number **[0091]** as follows:

[0091] The upper roller base 514 has upper roller recess 520 formed therein to receive a right upper roller 522 and a left upper roller 524. The right upper roller 522 and left upper roller 524 are both rotatively mounted about an axle 526 having a left end 528 and a right end 530. The upper roller recess 520 has at its left end 532 a pair of tabs 534 and 536 spaced apart to receive and support the left end 528 of the axle 526. The tabs 534 and 536 are spaced apart a distance less than the diameter 544 of the common axle 526 at the left end 528. Similarly, at the right end 538 a pair of spaced tabs 540 and 542 are spaced apart a distance less than the diameter 544 of the common axle 526. Therefore, the left end 528 and the right end 530

of the common axle 526 are rigidly supported in the upper roller recess 520 to preclude general fore and aft movement upon attachment thereto of the upper roller top housing 546.

Please amend paragraph number **[0094]** as follows:

[0094] The tape guide 558 has a roller recess 564 sized to receive the lower left roller 490 and lower right roller 488 therein to extend just barely above the top surface 566 of the tape guide 558. The lower left roller 490 and lower right roller 488 will contact the first length of adhesive tape supplied from the source of adhesive tape along a right tape track 570, a left tape track 568 and a second source for a second length of adhesive tape supplied from a second source ~~along a~~ along the right tape track 570. The left tape track 568 and the right tape track 570 are formed of material to provide for reduced friction so that the first length and the second length of adhesive tape may slide smoothly thereover. The left tape track 568 and the right tape track 570 may be slightly recessed to guide the left length and the right length and inhibit lateral movement thereof.

Please amend paragraph number **[0098]** as follows:

[0098] At the front end 574 of the tape guide 558, an entry surface 576 is formed at an angle 578 extending downwardly so that the surface 576 extends downwardly from the lower flat surface 579 of the left tape track 568 and a similar lower flat surface of the right tape track 570 (not here shown). It can also be seen in drawing FIG. 7 that the entry surface 576 extends outwardly at a second angle 580. The right tape track 570 extends outwardly at a similar angle. The second angle 580 and the left tape track 568 are provided to facilitate an entry of the respective first length of adhesively coated tape material and second length of adhesively coated tape material into their respective left tape track 568 and right tape track 570. The rollers 488 and 490 extend into the roller recess 564 so they can drivingly engage their respective lengths of adhesively coated tape material.

Please amend paragraph number **[00103]** as follows:

[00103] As generally depicted in drawing FIG. 16, an application structure 652 is positioned relative to a block 654 with a plurality of leadframes for semiconductor devices 656 moving relative to the application structure by indexing means such as a roller 657 driven by a stepping motor (not here illustrated). The application structure 652 includes a left punch plate 648 and a right punch plate 650, both positioned to be urged upwardly by respective solenoids ~~659~~ 658 and 660, both activated by conductors 662 and 664. As can be seen, solenoid ~~659~~ 658 urges the left punch plate 648 upward to, in turn, urge the left die 666 to move upwardly through the base of the application structure 652 to form and advance the first increment or decal upward against the underside of each frame of the plurality of frames of semiconductor devices 656 upon orientation of a first site relative to the left die 666. Similarly, punch plate 650 may be urged by its solenoid 660 to move upward relative to the plurality of frames of semiconductor devices 656 to form a second increment from the second length and to urge the second increment toward and attach it to the underside of a second site of a frame positioned relative to the second die 670.